

(No Model.)

F. L. SESSIONS.
ELECTRIC TRANSFORMER.

No. 564,944.

Patented July 28, 1896.

FIG. 1

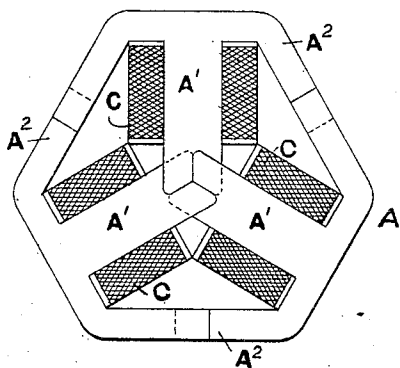


FIG. 2

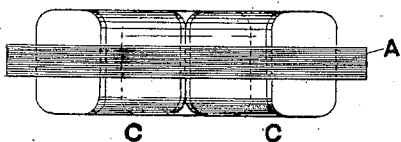


FIG. 5

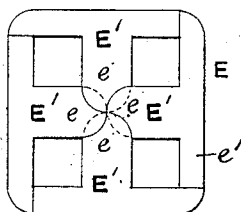


FIG. 3

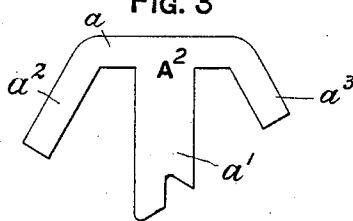


FIG. 4

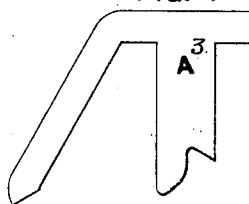


FIG. 6

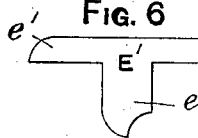
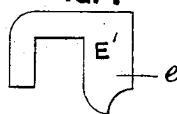


FIG. 7



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ELECTRIC TRANSFORMER.

SPECIFICATION forming part of Letters Patent No. 564,944, dated July 28, 1896.

Application filed September 28, 1895. Serial No. 563,971. (No model.)

To all whom it may concern:

Be it known that I, FRANK LORD SESSIONS, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Transformers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to improvements in laminated cores for electric transformers of that class designed for use in triphase or polyphase systems of electrical distribution.

A transformer-core constructed in accordance with my invention is made, in transverse section, in the shape of a closed polygon or annular figure having three or more inwardly-projecting limbs the planes of whose axes intersect in a common line which constitutes the central axis of the core. Each layer or lamina of the core is divided into as many parts or sections as there are inwardly-projecting limbs, the several sections being conveniently made of like sheet-metal punchings capable of being cut out by a single pair of dies. The dividing lines which separate the laminae-sections from each other are arranged to cut the adjoining ends of the tongues which go to form the inwardly-projecting limbs in such manner that the extremity of each tongue is longer upon one side of its axis than the other. The parts which project at either side of the inwardly-projecting tongues and form the peripheral portion of the core are furthermore made of unequal length, or if of equal length are terminated otherwise than upon radial lines intersecting the axis of the core. The several sections of the successive laminae are then reversely arranged in building up of the core and are thus made to break joints both along the axis of the core and in its peripheral portion.

The invention will be more fully understood from the following detailed description of the constructions illustrated in the accompanying drawings, in which—

Figure 1 is a transverse section of a triphase transformer constructed in accordance with my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a detail of one of the sec-

tional punchings of which the transformer-core is constructed. Fig. 4 shows a slightly-modified form of similar punchings. Fig. 5 is a transverse section of a transformer-core having four inwardly-projecting limbs. Fig. 6 is a detail of a punching for this type of core. Fig. 7 shows modified form of this punching.

In the triphase transformer shown the laminated core A is made of hexagonal shape with three inwardly-projecting limbs A', which converge at equal angles from the alternate sides of the hexagon, and which support the three sets of transformer-coils C. Each layer or lamina of said core is composed of three equal and similar pieces or sections A², that are punched from sheet metal and may all be cut out with a single pair of dies. Said several sections A² are each composed of an outer portion a, made of proper length and shape to form exactly one-third of the hexagonal periphery of the core, and an inwardly-extending tongue a', adapted to form a layer of one of the limbs A'. The extremities a² and a³ of the peripheral portion a on opposite sides of its tongue a' are made of unequal length, so that by reversing the arrangement of the segments in the successive laminae, i.e., by placing the punchings in each layer the other side up from those in the preceding layer, they are made to break joints. To the same end the inner extremities of the tongues a' are made longer on one side of their central axis than the other, and so shaped that while interfitting perfectly with each other the successive laminae are also made to break joints at the center of the core by the reverse arrangements of the sections above set forth. The exact shaping of such inner extremities of the tongue otherwise than in the particulars referred to is not important. The shape of the blank may also be varied in the distribution of its peripheral portion a with reference to its tongue a', although in every case said peripheral portion as a whole must be of such a size and shape as to form exactly one-third of the complete hexagonal ring. For example, in Fig. 4 I have shown a blank A³, equally adapted for use in the formation of the core described, but in which the ends of the peripheral portion are made of very different relative proportions from that shown

in Fig. 3, and various other modified forms of blanks may obviously be employed, if found desirable.

The same general principles of construction employed in the triphase transformer illustrated may obviously be applied in the construction of other multiphase transformers. For example, in Fig. 5 I have shown a core designed to receive four sets of coils, and provided with four inwardly-extending limbs instead of three. Each lamina E in this construction is formed of four sections E', having inwardly-extending tongues e, the meeting extremities of which are made longer on one side than on the other, so as to break joints in the alternate layers. This type of core is herein shown as square in its peripheral outline, and the peripheral portion e' of each section may be straight, as shown in Figs. 5 and 6, or L-shaped, as shown in Fig. 7. In any case, however, each peripheral portion will form exactly one-fourth of the entire periphery, and the several blanks or sections will be made exactly alike, so as to be capable of being produced by a single pair of dies.

Transformer-cores constructed in the manner thus set forth may obviously, because of their sectional construction, be made with much less waste of material than if each lamina were to be made of a single integral piece, and being formed of like punchings the number of tools required in their manufacture is reduced to a minimum. The reluctance of the magnetic circuit is, furthermore, very small owing to the fact that the successive layers break joints with each other. The general shape of the core as a whole is such that the several magnetic circuits provided are all

of equal length and consequently of equal magnetic reluctance. This advantage, however, is obviously independent of the particular shaping of the sections into which the laminæ are divided so long as the complete laminæ are made of the shape set forth, and an independent claim to this feature of construction has accordingly been made.

I claim as my invention—

1. A laminated transformer-core comprising an annular or polygonal peripheral portion and three or more inwardly-extending limbs radiating at equal angles about the central axis of the core, each lamina being formed of a plurality of like sheet-metal punchings equal in number to the number of said limbs and having limb-forming tongues interfitting with each other at the center of the core, the alternate laminæ being arranged to break joints, substantially as described.

2. A lamina for transformer-cores composed of three or more like sheet-metal punchings having inwardly-extending tongues arranged at equal angles with each other, and peripheral portions projecting unequal distances from the opposite sides of the outer ends of the tongues and adapted to unitedly form an annular or polygonal peripheral ring, the interfitting ends of the several tongues being each made of greater length on one side of its axis than the other, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK LORD SESSIONS.

Witnesses:

CHARLES C. MILLER,
FRED S. HUNTING.